

The Status and Conservation of Whooper Swans (*Cygnus cygnus*) in China

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Abstract There are five species of swan in the world. Three of them were recorded in China. They are whooper swan (*Cygnus cygnus*), whistling swan (*Cygnus columbianus*) and mute swan (*Cygnus olor*). Among them, whooper swan is the most famous in China. Whooper swan is a resident bird in China. They breed in Xinjiang Uygur Autonomous Region, Inner Mongol Autonomous Region, Heilongjiang Province, etc., and winter in Qinghai, Shandong, Henan Province, etc., and the lower reaches of the Changjiang River. The total number in China is about 5,000 in breeding grounds and 15,000 in wintering grounds. Higher number were found in 1960s. Because of the changes in environment and hunting, of picking up eggs and of catching nestlings, their population is being reduced rapidly. They are in danger now. In order to protect the whooper swans, some protection measures must be taken, such as strengthening public education and scientific research, establishing a base of raising and breeding; developing international cooperation, strengthening the construction of natural reserves in the breeding and wintering grounds. Up to the end of 1993, 34 natural reserves have been established in China.

Key Words: Whooper swan, *Cygnus cygnus*, status, conservation, China.

Introduction

There are five species of swan in the world. Three of them were recorded in China. They are whooper swan (*Cygnus cygnus*), whistling swan (*Cygnus columbianus*) and mute swan (*Cygnus olor*)^[1]. Among them, whooper swan is the most famous in China. Because of their nice body size and pure white feather, they are regarded as a symbol of beautiful angel, sign of lucky and emblem of honest. The territory of Heilongjiang Province looks like a standing whooper swan, so the bird was determined as the provincial representative bird in Heilongjiang Province in 1985. Harbin (the Capital of Heilongjiang Province) is called as a pearl city under the neck of whooper swan. Because of the change of the environment in recent years, their habitats are getting smaller and small, their nests were destroyed and eggs were taken away, so their number reduced rapidly. They are endangered. Now they have been listed as the Second Ranked Category Protection Bird in China Wildlife Protection Law.

Materials and Methods

We have done research on whooper swan since 1980 in

Heilongjiang Province, and collected materials. We used the method of the territorial and airplane survey. The survey was carried out in Heilongjiang province by airplane and territorial prospect; the other place by territorial prospect. We estimated the number of whooper swan for the places we did not survey by recently. On the base of survey and research, we calculated the numerical distribution of whooper swans in China.

Results

Breeding ecology

Whooper swan arrive in the breeding grounds in small groups (10-30 individuals) in middle March. In that time, snow and ice are still frozen partly. They gather and feed in melted pool and lake. The adults begin to act in a pair in the early April, and the juveniles move together still. The adults begin to nest in middle April. The nest was established in the center of pool or shallow lake. There are no high plants around the nest, so as to take off and land easily. They have a habit of using old nest for breeding. If the old nest still remain there, they will repair it then lay eggs in it. If the old nest was destroyed, they will look for another site near the old nest to set up a new one. The main materials of

nest in Heilongjiang Province are *Glyceria spiculosa* (over 80%), and some *Typha* spp., *Zizania caducifolia* and *Utricularia intermedia*, etc.^[2]. The nest is cone shape, and float in the water. The measurement of nest is 150 (140-170) cm in lower diameter, 85 (75-95) cm in the upper diameter, 10 (8-15) cm in depth, 35 (30-50) cm in height up water and 80 (50-120) cm in depth of water. They begin to lay egg in the late April. There are 4-8 eggs in a nest. The eggs is light brownish yellow. The measurement of eggs is 11.2 (9.8-12) × 7.1 (6.7-7.5) cm in size and 310 (280-365) g in weight. Both male and female join incubation. During incubation, the bird move down, one bird incubates eggs in nest, the other acts near nest and guard it. The period of incubation is about 31 days. The nestling is altricial. When got out the shell, the nestling is wet and with gray white feather. They could not stand and move. The body weight is about 200 g. They can walk after a day, then they leave the nest with their parents. When rest, they usually shelter under the adult's wings. When in danger, they climb up the back of adult and carried away by the adults. The nestlings begin to fly in three months old, and the body weight is up to 6 kg. The shape looks like their parents. Only small than adult and with light grayish brown feather. Whooper Swan begin to gather in the late September. They move and feed in a family group. They begin to migrate in 10-30 individuals in the end of October^[3,4].

Numerical distribution

Whooper swans are resident birds in China. They breed in Xinjiang Uygur Autonomous Region, Inner Mongol Autonomous Region, Heilongjiang and Gansu Province, etc., and winter in Qinghai, Shandong, Qinghai, Henan Province, etc., and the lower reaches of the Changjiang River. The total number in China is about 5,000 individuals in the breeding grounds and 15,000 individuals in the wintering grounds (Table 1)^[1,4,5,6,7,8].

The status of whooper swans in breeding grounds

Whooper swans are breeding birds in Xinjiang, Inner Mongol, Heilongjiang and Gansu Province, etc. in China. They were very common in these areas before 1970s, but now the total breeding population is only about 5,000 individuals in China. Whooper Swan has very large population in 1970s in Xinjiang. Over 20,000 individuals bred in Bayan Bulag Region before 1980s, but now only about 3,000 breed there now. The total breeding population in Xinjiang is about 4,500 now^[4,7,9]. Lakes and pools could be found everywhere in the Three River Plain Areas in Heilongjiang Province before 1970s. These lakes and pools provided an

excellent habitats for whooper swan. Over 2,000 pairs were seen here before 1970s in the breeding period. As the wetlands have been reclaimed since the end of 1970s on a large scale, their number was reduced quickly. We made a aerial survey on waterfowls in May 1984, 212 whooper swan were found here^[10]. We made a ground survey on Anatidae in 1990-1992, only about 50 were found here. The situation is similar in Inner Mongol and Gansu Province.

Distribution of whooper swan in stopover

Whooper swan are resident birds in China. But they migrate between south and north China. During migratory period, they can be seen in Jilin, Liaoning, Shanxi, Hebei Province, etc. in China^[1,7,11]. Some knowledge of the migratory routes of whooper swan in China is available. They are at least two migratory routes. The eastern route: Whooper swans breeding in Siberian, Russia migrate along Wusuli River, pass over Heilongjiang, Jilin, and Liaoning Province, cross the Bohai Sea, and winter in the Shandong Peninsula.

The western route: Whooper swans breeding in Xinjiang pass over Gansu, Guizhou, Ningxia, Shaanxi and Shanxi Province, etc., and winter in the lower reaches of the Changjiang River^[7].

The status of whooper swan in wintering grounds

Whooper swans winter in Henan, Shandong, Xinjiang and the lower reaches of the Changjiang River. There are three main wintering populations in China. The first population winter in Rongcheng Natural Reserve, Shandong Province: in 1980s, only 300-500 individuals winter here every year: because of successful conservation and providing foods for whooper swan, their number increased quickly: up to 1992, their wintering population had come to 5,000 individuals. The second wintering population is in Yancheng Natural Reserve, Jiangsu Province. Over 3,000 individuals were seen in January 1990^[6], but only 197 and 17 were seen in January 1991 and January 1992 here^[8]. The third wintering population is in Poyang Lake Natural Reserve, Jiangxi Province. Over 1,000 were seen in October 1989, and 2,104 were seen in January 1992^[6,11].

Wintering population were found in Bayan Bulag Region since the early 1980s. Only several tens found in winter at the beginning. Because food was provided for wintering whooper swans, their numbers increased quickly in recent years. The largest wintering population was up to 349 in December 1989, 95 were found in January 1992 in Shihezi^[8,12].

Apart from these wintering population, some wintering individuals were seen in Qinghai, Henan Province.

etc. (Table 1).

Table 1. The numerical distribution of whooper swan (*Cygnus cygnus*) in China.

No	Site	Location	Date	Ind	Stay type	Sources of Data
1	Honghe N.R. and Reaches of Heilongjiang River	Tongjiang, Heilongjiang P.	1984.5	69	B	Ma (1987)
2	Upper Reaches of Naoli River and Qixing River Basin	Baoqing, Fujin, Heilongjiang P.	1984.5	189	B	Ma (1987)
3	Xingkai Lake N.R.	Mishan, Heilongjiang P.	1984.5	5	B	Ma (1987)
4	Dalai Lake N.R.	Xinbarayou Banner, Inner Mongol A.R.	1988	50	B	Tong (1990)
5	Ertix River and Ulungur River Basin	Fuhai, Burqin, Xinjiang Uygur A.R.	1990	1,000	B	Yuan (1992)
6	Bosten Lake	Bohu, Xinjiang Uygur A.R.	1990	200	B	Yuan (1992)
7	Bayan Bulag Swan N.R.	Hejing, Xinjiang Uygur A.R.	1988	3,000	B	Lu (1990)
8	Gahai N.R.	Maqu, Gansu P.	1988	100	B	Lu (1990)
9	Xingkai Lake N.R.	Mishan Heilongjiang P.	1991.3	455	M	This paper
10	Xingkai Lake N.R.	Mishan, Heilongjiang P.	1991.10	481	M	This paper
11	Bayan Bulag Swan N.R.	Hejing, Xinjiang Uygur A.R.	1988	5,000	M	Lu (1990)
12	Shihezi Region	Shihezi, Xinjiang Uygur A.R.	1988	700	M	Yuan (1992)
13	Changlindao N.R.	Baoqing, Heilongjiang P.	1990.4	300	M	This paper
14	Dalnoer N.R.	Cifeng, Inner Mongol A.R.		2,500	M	Gao (1992)
15	Momoge N.R.	Zhenlai, Jilin P.	1985.3	47	M	Wu (1992)
16	Momoge N.R.	Zhenlai, Jilin P.	1985.10	166	M	Wu (1992)
17	Bayan Bulag Swan N.R.	Hejing, Xinjiang Uygur A.R.	1992.1	74	W	Ma (1993)
18	Beidagang	Beijing	1990.1	24	W	Lu (1990)
19	Tanyang N.R.	Wudi, Shandong P.	1984.12	202	W	Lu (1987)
20	Old Course of Yellow River	Hejun, Shandong P.	1988.12	26	W	Lu (1990)
21	South Four Lake N.R.	Weishan, Shandong P.	1988.12	40	W	Lu (1990)
22	Lai Zhou Bay	Weifang, Shandong P.	1988.12	30	W	Lu (1990)
23	Jiaozhou Bay	Qingdao, Shandong P.	1990.1	6	W	Lu (1990)
24	Rongcheng, Sea Beach	Rongcheng, Shandong P.	1990.1	5,000	W	Ma (1993)
25	Pangzai	Pangzai, Henan P.	1993.1	171	W	Lu (1994)
26	Heigangkou	Heigangkou, Henan P.	1993.1	33	W	Lu (1994)
27	Shihezi Region	Shihezi, Xinjiang Uygur A.R.	1992.1	95	W	Ma (1993)
28	Qinghaihu N.R.	Gangca, Qinghai P.	1982.12	1,200	W	Liao (1985)
29	Caidamu River Basin	Zongjiafangzi, Qinghai P.	1991.1	83	W	Lu (1994)
30	Yancheng N.R.	Yancheng, Jiangsu P.	1990.1	3,000	W	Shi (1990)
31	Shaobo Lake	Yangzhou, Jiangsu P.	1990.1	42	W	Shi (1990)
32	Poyanghu N.R.	Yongxiu, Jiangxi P.	1989.10	1,000	W	Shi (1990)

N.R. Natural Reserve, P. Province, A.R. Autonomous Region, B. Breeding, M. Migration, W. Wintering

Breeding Density and Family Construction of Whooper Swans

Density and breeding success rate in breeding ground

Whooper swans breed in Xinjiang, Inner Mongol and Heilongjiang Province, etc. in China. Their breeding density are different in every region, but the distance between nests is usually over 1,000 m. The average nest density in Bayan Bulag Natural Reserve is 2.8 individuals/km². According to the survey in August The population density in Heilongjiang Province is very lower. Only 6 nests were found in Changlindao Natural Reserve in 1992. The density was 0.06 indi-

1988 in Bayan Bulag Natural Reserve, 197 whooper swans were found in the three survey lines (the length was 35 km, and the wide was 2 km). Among them, non-breeding individuals were 63, accounting for 31.4% of the total numbers; the pairing individuals were 60 (30 pairs), accounting for 30.6% of the total numbers; the successful breeding individuals with nestling were 26, accounting for 13.2%; and 49 nestling were seen, accounting for 24.8% of the total numbers. The successful breeding individuals were 17.6% of the total adults and juveniles.^[14] individuals/km². The distance between nests was over 2 km².

Table 2. Natural Reserve Mainly on Whooper Swan in China.

No.	Name	Location	Area (hm ²)	Time
1.	Sanjiang N.R.	Fuyuan, Heilongjiang P.	227,000	1994
2.	Xinglong Reed. Wetland N.R.	Fujin, Heilongjiang P.	8,400	1986
3.	Honghe N.R.	Tongjiang, Heilongjiang P.	21,000	1984
4.	Qixinghe N.R.	Baoqing, Heilongjiang P.	20,000	1992
5.	Changlindao N.R.	Baoqing, Heilongjiang P.	20,000	1991
6.	Xingkai Lake N.R.	Mishan, Heilongjiang P.	223,000	1986
7.	Heiyupao N.R.	Daqing, Heilongjiang P.	14,000	1988
8.	Zhalong N.R.	Qiqihar, Heilongjiang P.	210,000	1979
9.	Dalai Lake N.R.	Xin Barayou Banner, Inner Mongol A.R.	400,000	1986
10.	Dalinoer N.R.	Keshiketengqi, Inner mongol A.R.	92,763	1987
11.	Kerqin N.R.	Kerqin Youyizhongqi, Inner Mongol A.R.	136,000	1984
12.	Xianghai N.R.	Tongyu, Jilin P.	105,467	1986
13.	Momoge N.R.	Zhenlai, Jilin P.	144,000	1981
14.	Benxi Birds N.R.	Benxi, Liaoning P.	700	1984
15.	Shuangtaihe N.R.	Panjin, Liaoning P.	80,000	1988
16.	Yuwulushan N.R.	Yixian, Liaoning P.	11,351	1993
17.	Beidaihe N.R.	Beidaihe, Hebei P.	150	1990
18.	Tanyang N.R.	Wudi, Shandong P.	10,000	1989
19.	Old Course of Yellow	Weihui, Henan P., River N.R.	3,030	1988
20.	The Delta of Yellow, River N.R.	Dongying, Shandong P.	10,000	1989
21.	Rongcheng Swan N.R.	Rongcheng, Shandong P.	6,700	1984
22.	South Four Lake N.R.	Weishan, Shandong P.	120,000	1982
23.	Qingtong Gorge, Reservoir N.R.	Qingtongxia, Ningxia P.	3,600	1984
24.	Qinghai Lake N.R.	Gangca, Qinghai P.	708,000	1979
25.	Bayan Bulag Swan N.R.	Hejiang, Xinjiang Uygur A.R.	100,000	1986
26.	Gahai N.R.	Maqu, Gansu P.	10,800	1980
27.	Sanmen Gorge, Waterfowls N.R.	Tongyuan, Shaanxi P.	39,000	1982
28.	Yuncheng Swan N.R.	Yuncheng, Shanxi P.	4,800	1993
29.	Hejun N.R.	Hejun, Shanxi P.	4,689	1993
30.	Yancheng N.R.	Yancheng, Jiangsu P.	40,000	1983
31.	Xiangyang Reservoir N.R.	Sihong, Jiangsu P.	1,870	1983
32.	Xinglongshan N.R.	Qidong, Jiangsu P.	3,800	1989
33.	East Dongting Lake N.R.	Yueyang, Hunan P.	190,300	1994
34.	Poyang Lake N.R.	Yongxiu, Jiangxi P.	22,400	1983

N.R.: Natural Reserve; P.: Province; A.R.: Autonomous Region

The construction of family in stopover and wintering ground

Whooper swan begin to migrate in the late September. The Juveniles leave breeding grounds at first, then non-breeding adults; breeding birds with their nestling leave the breeding grounds at last. When migration, a few families consist to a small groups with 10-20 individuals to migrate together. According to our observation in October 1992 in Xingkai Lake Natural Reserve, Heilongjiang Province, we counted 19 groups. The total number was 121 individuals, and 38 families were found. The largest group was 16 individuals, and the smallest group was 4 individuals. One family was 2 adults with 4 nestlings; 4 families were 2 adults with 3

nestlings; 10 families were 2 adults with 2 nestlings; one family was 1 adults with 3 nestlings; 10 families were 2 adults with 1 nestlings; 8 families were only two adults; 2 families were 1 adult with 2 nestlings; 1 family was only 1 adult. We also saw a group with 38 juveniles and adults. A survey was made in winter in 1988-1992 in Bayan Bulag Natural Reserve. The wintering numbers were 235 in November 1988, 349 (including 65 nestlings) in January 1989, and 89 in January 1991, and 74 in January 1992. The rate of adults and nestlings were 15.3-25.7 %, the rate of adults and nestlings was 12-17% in Qinghai Lake Natural Reserve, Qinghai Province and about 20 % in Chengkou, Shandong Province.^[15]

Threat for whooper swan

The main threat for whooper swan are from human beings. Because of over reclamation of wetland, their habitats lost on a large areas. Over 60 % wetland in the Three River Plain Areas in Heilongjiang Province has lost since 1970s. Fishers collect their eggs and catch their nestlings during breeding period. Hunters hunt them in wintering grounds; in addition to the environment pollution, their number decreased quickly in these years. They are in endangered, and had been listed as the Second Ranked Category Protection bird in China Wildlife Protection Law now.

Discussion

Whooper swan is a large waterfowl in China. High numbers were found in the 1960s. Because of the change of environment and hunting, pick up eggs and catch nestlings, their population reduced rapidly. They are in danger now. In order to protect whooper swan, some protection methods must be carried out:

1. strengthening public education and propaganda of China Wildlife Protection Law;
2. strengthening scientific research, establishing a basement of raising and breeding, to resume wild population; meanwhile doing research on banding;
3. developing international cooperation on migration.
4. strengthening the construction of natural reserves in the breeding and wintering grounds. Up to the end of 1993, 34 natural reserves were established in China (Table 2)

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